

RUTGERS



Celebrate

Scarlet's Great Adventure

School of Environmental and Biological Sciences
School of Arts and Sciences
School of Engineering

Scarlet Knight **RU27**

December 9, 2010 . Thursday . 6:00 p.m.

Smithsonian National Museum of Natural History
Baird Auditorium and Sant Ocean Hall

THE MISSION

Rutgers Institute of Marine and Coastal Sciences' undersea Slocum glider *RU27*, christened *Scarlet Knight* by the U.S. Integrated Ocean Observing System (IOOS), was launched from Tuckerton, New Jersey on April 27, 2009. For 221 days, scientists and students on both sides of the Atlantic navigated the *Scarlet Knight* 7,400 km eastward across the ocean's ever-changing eddy field, avoiding fishing and shipping activity, dodging storms and hurricanes, and surviving the biological onslaught of barnacles and predatory fish.

Entering Spanish waters during the stormy North Atlantic winter, the *Scarlet Knight* was recovered off the coast of Spain by the Puertos del Estado research vessel *Investigador*. Exactly 1 year ago today, on December 9, 2009, the *Scarlet Knight* made safe landfall in Baiona, Spain, the first port visited by Columbus' caravel *La Pinta* upon its return from the New World in 1493, and now the first port of entry for a truly ocean-class undersea glider.



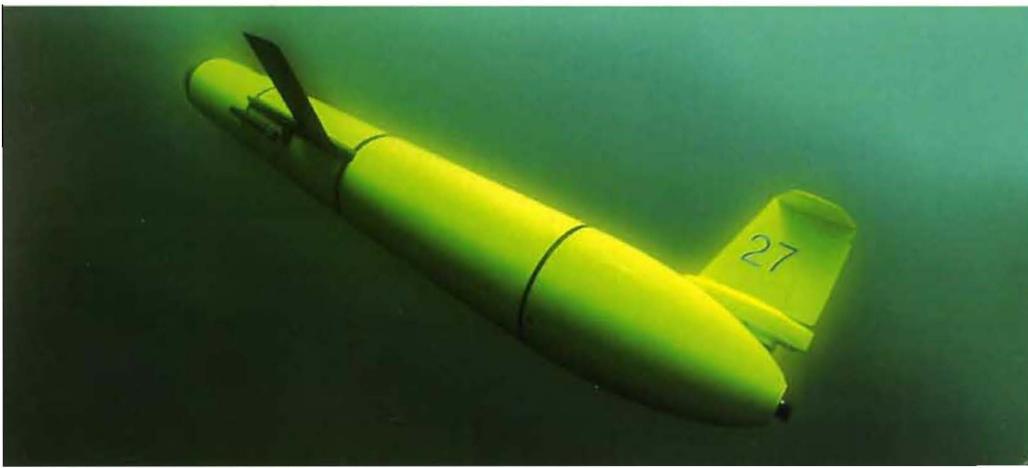
Rutgers oceanographers Josh Kohut (left) & Scott Glenn aboard the *Investigador* after recovering the *Scarlet Knight* in Spanish waters.



Rutgers oceanographer Oscar Schofield (center) works with the Atlantic Crossing students in the COOLroom in New Jersey.

Front Cover Photo: The Investigador approaches the Scarlet Knight minutes before recovery.

RU27, the Scarlet Knight, begins her Trans-Atlantic journey offshore Tuckerton, New Jersey.



THE MOVIE

"Atlantic Crossing: A Robot's Daring Mission" is a feature length story of scientific adventure and exploration.

Film synopsis: A team of passionate and daring scientists race against time to navigate the first autonomous robot across the vast and dangerous Atlantic Ocean.

This historic scientific mission was documented in its entirety by award winning filmmaker Dena Seidel and her students at Rutgers' Writers House. With unprecedented access to world-renowned oceanographers, the documentary team spent a year and a half capturing *cinema verité* science-in-the-making. The result is a dramatic feature film that captures the day-to-day challenges, choices, and emotions of Scarlet's historic journey and the intrepid scientists behind the mission.

"RU27 is similar to the Mars Rover. She has to go out into a harsh environment, survive in that environment, and then do a science mission. There are very few things more risky that you can do with a robot than this." Scott Glenn, Rutgers oceanographer.



Rutgers filmmaker Dena Seidel capturing the moment of recovery on board the Investigator's Zodiac.



Rutgers Writers House student Documentary Team capturing the moment of recovery in the COOLroom.

DOCUMENTARY TEAM:

Dena Seidel
Pilar Timpane
Igor Heifetz
Lizette Gesuden

Chantal Eyong
Stephen Beeston
Scott Lazes
Amanda Bullis

Dan Crowell
Justin Matthew LaDeau
Alex Prister



UNDERGRADUATE EDUCATION

The trailblazing flight of the *Scarlet Knight* was inspired by a NOAA grand challenge: Pilot an undersea glider across the Atlantic on a mission of discovery that advances student involvement in ocean science and engineering.

To accomplish this, Rutgers Professors Glenn, Schofield and Kohut established the *Atlantic Crossing* course sequence. Students as early as their freshman year from a range of disciplines participate in a series of collaborative apprenticeships in a team environment. Their course work for the *Scarlet Knight* was to increase glider endurance by a factor of 10, develop the interactive data displays to navigate uncertain seas, and engage an international team of collaborators to provide guidance as our gliders approach foreign waters. Their textbook was the interactive blog they helped write as the mission progressed.

The lasting result is a 10-fold increase in undergraduate participation in the Coastal Ocean Observation Lab – known to the students as the COOL room. A private gift also established a summer internship program in the COOL room, enabling year-round learning.



A Rutgers freshman Engineering student prepares the Scarlet Knight's internal electronics for sea trials.



International exchange students from the Azores and the Canaries work in the COOLroom planning the approaches to Baiona, Spain as the primary landfall site and Lisbon, Portugal as the backup.

Students in the Fall 2009 Atlantic Crossing course proudly pose for their group photo the day the Scarlet Knight returned to Rutgers.



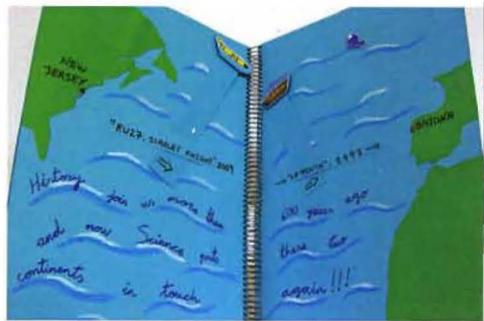
K-12 EDUCATION

A total of 117 students from 45 classrooms across the U.S. wrote letters to be sent across the Atlantic on the memory stick inside the *Scarlet Knight's* payload bay. Because the *Scarlet Knight* was on a mission of discovery, no one was sure where it would end up or even if it would make it. In essence, students sent an old fashioned "message in a bottle," only this bottle was a high-tech robotic undersea glider. The schools then anxiously followed the progress of the *Scarlet Knight* to see if their letters would make it.

Across the Atlantic, students in Spain were writing their own letters back to the students and scientists at Rutgers as they watched the glider approach. During the *Scarlet Knight's* voyage, at least 2 schools and over 50 students in Spain followed her progress by posting daily updates in their hallways. When the *Scarlet Knight* made landfall in Baiona, Spanish students were selected to read their letters aloud as Spain's Minister of Public Works and Transport returned the *Scarlet Knight* to the U.S. government through White House representative Jerry Miller.



Ms. Lucas' students from the Village Elementary School in Montgomery, NJ greet the Scarlet Knight in their classroom upon her return to America.



Picture book authored by the young students in Baiona, Spain. The text reads: "History joined us more than 500 years ago, and now Science puts our two continents in touch again!!!"

Students from Baiona, Spain surround the Scarlet Knight in front of the television cameras.



COLLABORATIVE EXPLORATION

The *Scarlet Knight's* successful Atlantic crossing is a historic demonstration of national and international collaboration. The partnership between Rutgers and Webb Research began in 1999, resulting in the first at-sea deployment of a Slocum glider by Doug Webb and then student Josh Kohut offshore Tuckerton, NJ. That partnership, initiated by the National Ocean Partnership Program, has been sustained by the Office of Naval Research, the National Science Foundation, the National Oceanographic and Atmospheric Administration, the Gordon & Betty Moore Foundation, and the Department of Homeland Security.

Ten years later, funded in part by a gift from a Rutgers alumnus, the *Scarlet Knight* was launched from the same port where Slocum gliders first went to sea. International partners at Puertos del Estado, the Universidad de Las Palmas de Gran Canaria, PLOCAN, and Qualitas in Spain and the University of the Azores in Portugal made possible the recovery in Spanish waters. This tradition of collaboration is the core of both the U.S. IOOS and the Global Earth Observation System of Systems.



Scientists from Spain and the U.S. return to the *Investigador* after first contact with the *Scarlet Knight* in Spanish waters.



Plaque on the seawall in Baiona, Spain commemorating the historic voyages of the Pinta and the *Scarlet Knight*.

Jersey Roots, Global Reach: Scientists, Captain and Crew aboard the Investigador pose for the recovery photo sent from sea to newspapers around the world.



THE CHALLENGER MISSION

The *HMS Challenger* began the first dedicated scientific circumnavigation of the globe in 1872, a response to the growing public debate on evolution. The British research vessel traversed 111,000 kilometers in 3.5 years, exactly 15 times the distance covered by the *Scarlet Knight*. At the *Scarlet Knight*'s landfall ceremony in Baiona, NOAA presented the oceanographic community with another grand challenge: Pilot a coordinated international fleet of gliders along synchronized legs that revisit the historic track of the *HMS Challenger*.

As with the first Trans-Atlantic glider mission, a circumnavigation will require the use of new technologies like the energy harvesting Slocum Thermal glider. It will require the development of new international partnerships around the globe that link glider technology centers in the U.S. and Europe with new centers developing on other continents. Support to build and deploy this new fleet of ocean-class gliders, and scale up global glider technology centers, is crucial to the mission. Most importantly, it will require us to excite a new generation of global ocean explorers as we prepare to meet the challenges of our changing water planet.



Teledyne Webb's Slocum Thermal Glider deployed from the Virgin Islands and piloted by undergraduate summer interns.



Track of the HMS Challenger, the first scientific circumnavigation of the globe from 1872-1876.



THE TEAM



THE DEDICATION

Douglas Webb, the visionary inventor of the Slocum Glider, through his lifetime commitment to excellence in ocean sensing technology, has delivered to our community a new platform and a new paradigm for ocean exploration. Now all of us, together, can be explorers of the sea. The entire *Scarlet Knight* team thanks Doug for his inspiration, throughout this historic endeavor and into the future.



Doug and Rebecca Webb with the *Scarlet Knight* and the *Pinta* in Baiona, Spain.



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71 Dudley Road . New Brunswick . 08901